INTERACTIVE EFFECT OF SCREEN TIME, DISTANCE FROM SCHOOL AND SOCIO-ECONOMIC STATUS ON MATHEMATICS PERFORMANCE OF ELEMENTARY LEARNERS

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ABSTRACT

The purpose of this study was to investigate the interactive effect of screen time, distance from school, and socio-economic status on the mathematical performance of elementary school learners. The research was carried out at San Juan Elementary School located in the Nabunturan East District of the Schools Division of Davao de Oro, Philippines. The participants who have taken part in the study were the 128 learners in grades 1 through 6. A quantitative-correlational research design, employing survey questionnaires as the primary means of data collection and the learner's grade as the basis of mathematics performance was adopted in the study. The survey questionnaires for the study included queries concerning the amount of time that a learner spent watching television, using computers, tablets, and cellphones, as well as the distance that the student residence from the school and their level of socio-economic status. The gathered data went through statistical analysis using percentage, mean and Pearson r correlation. As for the result, a negative association was found between the amount of time spent in front of a screen and the performance in mathematics, indicating that the performance of learners in mathematics declines as the amount of time spent in front of a screen increases. However, distance from school and socio-economic status did not have a significant impact on mathematics performance, they did not influence each other. Therefore, the study suggests that rigorous regulation of screen time be implemented, as well as the development of more effective teaching strategies and compassion to respond to the diverse needs of every learner.

Keyword: *screen time, distance from school, socio-economic status, mathematics performance, quantitative-correlational study*

1. INTRODUCTION

In today's digitally driven world and the ongoing issue of limited resource accessibility, the interplay of screen time, distance from school, and socio-economic status has risen as a crucial determinant of academic achievement, particularly in mathematics (Bhosale, et al., 2021). As technology continues to penetrate multiple facets of everyday life, heightened concerns have emerged regarding its impact to education. Simultaneously, the existence of unfair access to educational resources because of the differences in geographical location and financial standing continuously remain as parts of the significant obstacles in attaining educational fairness. Gaining a comprehensive

understanding of the intricate relationship between these factors is crucial to address discrepancies in mathematics achievement and foster a comprehensive educational setting.

In Australia and New Zealand (Skvarc, et al., 2017), increasing concerns have been raised about the potential impact of screen time on childhood academic performance. It has been determined that a number of different factors play a significant role in determining the academic achievement of students. These elements consist of the environment and routines at school and home of the learners which affects the sleep and concentration of the learners. So as the type of screen time of the students which appears to be contingent upon the socio-economic condition of the family involved.

The Programme for International Student Assessment (PISA) International report in 2018 revealed that Filipino learners' average score was significantly lower than the Organization for Economic Cooperation and Development (OECD) indicating a below Level 1 proficiency (OECD, 2019). Various factors drive the poor performance of learners in mathematics. A study by Reyes (2023) revealed that elementary learners in National Capital Region (NCR) of the Philippines who suffers poverty has significant lower mathematics scores among elementary learners. Parents from low-income households are more likely to work longer hours, making it difficult for them to help their children with schoolwork. They also have less money for transportation and food, and may struggle to monitor their children's screen time compared to high-income households. Since Philippines is a developing country these problems are rampant and needs to be address now.

Locally, despite of the development felt by other Filipinos, rural areas still face the same problems such as educational opportunities. Several learners must traverse considerable distance to reach school with empty hands. Nevertheless, the potential of technology is boundless, allowing children to effortlessly explore the world and find leisure with just one simple click, often without realizing they are overdoing it. This phenomenon is highly observable in the elementary learners. Learners used their smartphones and watch videos from the television all the time during their breaks. In addition, since Nabunturan, Davao de Oro is surrounded with vast land area which is used as rice fields. Most of the families are working as farmers and learners travel a considerable distance to reach school. These factors have great potential in influencing the academic performance of learners especially in mathematics.

Technology reshapes the traditional ways of education and entertainment (Means, et al., 2009). According to Mehmood and Taswir (2013), E-learning is an important tool for learners. Online social networking sites engage students and need to be studied as distributors of information. Both of social networks and video games have contributed to the expansion of the interactive character of technology, which led in the creation of dynamic platforms for communication and entertainment. Throughout its history, the internet has undergone a continual evolution that has been driven by the development of new applications that have enhanced both educational and recreational experiences.

In 2014 Liparenko, et al. concluded, children who use the internet on frequent intervals are more probable to demonstrate a lesser amount of interest in learning as well as in studying on their own initiative. This pattern is concerning since it may indicate a drop in the intrinsic desire to learn. With the knowledge that academic achievement is largely influenced by intrinsic motivation (Abdelrahman, 2020). Loss of self-motivation equates to decrease of academic success.

Regardless of the numerous detrimental effects associated with screen time. Interactive and engaging content in educational apps are promoting effective learning among children, stated by Hirsh-Pasek, et al., 2015. Recognizing the variances in individuals' screen use and emphasizing the necessity for tailored strategies to facilitate favorable educational achievements (Rideout & Robb, 2019) and children's effective and safe use of technology (Livingstone & Bulger, 2013) will produce great academic outcome.

The educational accomplishments of a child are determined by a number of factors, including the child's family, the behavior of their family, their socioeconomic status, and the child's behavior toward their parents (Balachandran, et al., 2023). It is common for the financial resources of parents to be the determining factor in whether or not their children can pursue good education (Hout, 2012). In numerous instances, the degree to which children are able to obtain a quality education is dependent upon the financial means of their parents. According to Reardon, et al. (2019), families with higher incomes are more likely to be able to afford living in communities that have well-funded schools, hiring tutors, and providing additional educational resources, all of which contribute to a more richer learning environment. Additionally, families with lower incomes may observe that their children do not attain the same levels of achievement as their counterparts from higher-income households (Okioga, 2013).

According to Ward in 2013, the impact of distance on students' levels of academic success, absenteeism, and participation in extracurricular activities is considerable. It has been demonstrated through research that the amount of time spent walking to and from school and home can have an impact on the learning outcomes the kids experience. In the event that there are tough terrains, woods, or even rivers or streams that do not have bridges, the situation would be extremely dire. This is supported by Metsamuuronen and Kale (2013), who discussed on a high degree of positive

correlation between distance from home and achievement in Mathematics. Children's learning achievement has been affected by the distance between their homes and their schools.

Moreover, academic performance is defined as a student's measurable and observable conduct over a given period of time, Yusuf, et al. (2016). It can be affected by a variety of other factors, including social standing, the degree of education obtained by one's parents, the amount of time spent in school, and so on (Jayanthi, et al., 2014). According to Ajzen (2011), certain performance achievements are influenced by the individual's attitude, subjective norm, and perceived level of control over the situation. Concluding, many aspects are influencing an academic performance of a learner varying on the given circumstances (Farooq, et al., 2011).

1.1 Research Problem

1. How many hours do learners spend on screen time?
2. How far is the distance from the learner's home to school?
3. What is the level of the learner's socio-economic status?
4. What is the level of academic performance of learners in Mathematics?
5. Is there a significant relationship between the academic performance of learners in mathematics and the following variables:
   5.1 Screen Time?
   5.2 Distance from School?
   5.3 Socio-economic Status?

1.2 Null Hypothesis

The hypothesis was tested using the appropriate statistical tool set at 0.05 level of significance.

HO_1: There is no significant relationship between the academic performance of learners in mathematics and the following variables:

A. Screen Time?
B. Distance from School?
C. Socio-economic Status?

2. METHODOLOGY

2.1 Research Design

This study employed a quantitative approach using correlational research design. Correlational research design examines the relationship between two variables without the researcher manipulating a variable and reflects the strength or direction of the relationship (Bhandari, 2023). This design allowed the researcher to observe correlation and patterns between screen time, distance from school and socio-economic status to the mathematics performance of learners. Statistical analysis on the results of the gathered data was employed.

2.2 Research Respondents

The respondents of this study were the 128 officially enrolled learners in Grades 1 to 6 of San Juan Elementary School, Barangay Basak, Nabunturan, Davao de Oro on the academic year 2023-2024. Parents' participation was necessary in the process of responding to the survey questions pertaining to socio-economic status. The researcher employed the census sample technique due to the limited population size of the school. Self-enumeration method was conducted in this study. Shown in Table 1 is the Number of respondents from the six-grade levels.

Table 1
Respondents of the Study

Grade Level	Total
Grade 1	13
Grade 2	25
Grade 3	25
Grade 4	22

Grade 5	19
Grade 6	24
Total	**128**

2.3 Research Procedures

The researcher sent a letter of request addressed to the Schools Division Superintendent of Davao de Oro. An Ethics endorsement was sent to the School Head of San Juan Elementary School granting permission to the researcher to conduct the study. Furthermore, the researcher delivered a formal letter intended to the parents of the respondents, seeking their approval for participation in the study.

Prior to the start of data collection, the researcher had diligently completed all the necessary documentation for the administration of the study instrument including the approval from the Ethics Committee. To ensure the validity and reliability of the results, the researcher personally administered the research instrument. The task was executed with utmost attention, ensuring that all components of the instrument were comprehensively explained to facilitate the understanding of the learner respondents regarding the nature of the questions asked.

Immediately after the process of data retrieval, the researcher proceeded to organize and consolidate the data gathered, present them to the statistician for statistical analysis. Following this, the data underwent additional analyses and interpretations using statistical tools.

2.4 Statistical Treatment of Data

The data obtained were tallied and tabulated and the statistical tools used to ensure the accuracy in the analyses and interpretations of the findings are the following:

Percentage and Mean were used to determine the level of competencies for screen time, distance from school and socio-economic status.

Pearson correlation coefficient was used to determine the difference between the Mathematics performance of learners according to their screen time, distance from school and socio-economic status.

3. RESULTS AND DISCUSSION

Table 2: Screen Time

	MEAN	INDICATOR
1. How much time do you spend watching TV each day?	1.81	1.5 Hour
2. How much time do you spend playing video games each day?	1.80	1.5 Hour
3. How much time do you spend using other electronic devices, such as computers, tablets, and smartphones, each day?	1.76	1.5 Hour
4. How much time do you spend using screen media for school-related activities each day?	1.40	1.5 Hour
TOTAL	**1.69**	1.5 Hour

Table 2 shows that in question 1, “How much time do you spend watching TV each day?”, has the highest mean score with 1.81. This is because TV is the most accessible technology for learners. While, question 4, “How much time do you spend using screen media for school-related activities each day?” has the lowest mean score with 1.40. According to learners, doing school-related work using technology is not usually done because of the difficulty of internet access. The overall mean for the screen time of the learners is 1.69, indicating a 1.5 hour of daily screen time. Learners are highly engaged in media use everyday. The findings are in line with a study conducted in 2014 by Liparenko et al., it was found that children who engage in frequent internet use are more likely to exhibit reduced interest in independent learning and studying. The observed pattern is of particular concern as it potentially signifies a decline in the innate motivation to acquire knowledge. The absence of intrinsic motivation may lead to a potential delay in task completion and a lack of interest in reviewing lessons, ultimately resulting in subpar academic performance and a diminished likelihood of overall success in the educational setting.

Table 3: Distance from School

	MEAN	INDICATOR
Distance of Learner's residence from school	1.61	2.5 km

In accordance with the data presented, the mean score from the learners' answers for the distance from the learner's house to the school is 1.61, which suggests that the distance of two and a half kilometers. It appears from this that the majority of learners reside a considerable distance away from their school and the measure of distance is doubled for a round trip. According to Ward in 2013, the impact of distance on students' levels of academic success, absenteeism, and participation in extracurricular activities is considerable. The amount of time spent walking to and from school and home can have an impact on the learning outcomes the kids experience. However, the study conducted by Sherpa (2022) revealed that students exhibited preferences when it came to the subjects they were studying. The performance of students in certain subjects exhibits significant results, even when considering the considerable distance they have to travel. It has been emphasized that students ought to put their focus on academically demanding courses, such as mathematics, English, and science. These disciplines are widely recognized as subjects that contribute significantly to career development. Contrary to the generally low performance of students in other subjects, there is a noticeable lack of attention given to these disciplines. Therefore, often students to encounter difficulties to excel in them.

Table 4: Household Income of Parents

INCOME LEVEL	NUMBER OF RESPONSE	PERCENTAGE
Php 1.00 - 10, 000	55	42.97%
Php 10, 001 – 20, 000	39	30.47%
Php 20, 001 – 30, 000	22	17.19%
Php 30, 001 – 40, 000	8	6.25%
Php 40, 001 – 50, 000	3	2.34%
Php 50, 001 – 60, 000	1	0.78%
Total	**128**	**100%**

Table 4 presents that 42.97% of the respondents came from families with monthly income ranging from Php 1.00 to 10,000. It is observed from the table that as the income level of families increases, the percentage of households decreases. The data suggests that most of the participants have a low socioeconomic status, as they reside in rural areas and were not able to earn higher education degree. The majority of the respondents' parents were engaged in agricultural work and domestic duties, which are characterized by their lack of permanence and typically yield below minimum wage. In a study conducted by Eghbalzad et al. (2016), it was discovered that individuals with strong learning abilities have a propensity to offset the disadvantages commonly linked to being raised in a lower socio-economic household. Parent's involvement in their children's education can have a significant impact on reducing the disparity in academic achievement that is often associated with socio-economic status. With tremendous support from their surroundings and innate abilities learners can reduce the impact of socio-economic disparity.

Table 5: Mathematics Performance

GRADE LEVEL	MEAN	CLASS PROFICIENCY	LEVEL OF COMPETENCY
Grade 1	18.31	92%	Outstanding
Grade 2	14.56	73%	Did not meet Expectations
Grade 3	21.80	73%	Did not meet Expectations
Grade 4	23.41	59%	Did not meet Expectations
Grade 5	21.05	53%	Did not meet Expectations
Grade 6	31.21	78%	Fairly Satisfactory
Total	**28.10**	**70%**	**Did not meet Expectations**

Table 5 displays the mathematics performance of the learners is based on their test scores, which has a mean score of 28.10. The competency level of the learners corresponds to did not meet expectations. Based on the results, Learners show poor mathematics performance. This learners' low performance may be attributed to a variety of circumstances, either directly or indirectly including the difficulty index of the questions. According to Yusuf et al. (2016) define academic performance as the quantifiable and observable conduct of a student all throughout a specific timeframe. It can be influenced by multiple other components, that include socioeconomic status, parental academic achievement, the length of attending school, among other factors (Jayanthi, et. al, 2014). Ajzen (2011) posits that an individual's attitude, subjective norm, and perceived amount of control over a circumstance have an impact on specific performance accomplishments. In conclusion, several factors influence the academic performance of a learner, which might change depending on the specific conditions (Farooq, et. al, 2011).

Table 6: Significant Relationship Between Screen time and Mathematics Performance of Elementary Learners

Variables	Pearson Correlation	Correlation Coefficient	Remarks
Screen Time	-0.459	0.000	Significant
Mathematics Performance			

A correlation was conducted to test the relationship between Screen Time and Mathematics Performance of learners, Pearson correlation of -0.459 which is significant and correlation coefficient of 0.000 indicates negative correlation. This indicates that there is an inverse relationship between the amount of time spent using screens and learner's Mathematics Performance. As one variable exhibits an upward trend, the other variable demonstrates a corresponding downward trend, indicating a negative correlation between the two. . It was evident that learners often prioritize activities such as browsing social media, watching television, and playing video games over reviewing past lessons and accomplishing assignments. According to Hale and Guan (2015), connection between increased screen time and sleep disruptions among school-aged children and adolescents which results to lack of energy and focus to participate in class.

Table 7: Significant Relationship Between Distance from School and Mathematics Performance of Elementary Learners

Variables	Pearson Correlation	P-value	Remarks
Distance from School	-0.112	0.206	Not Significant
Mathematics Performance			

A correlation was conducted to test the relationship between Distance from school and mathematics Performance of learners, Pearson correlation of -0.112 which indicates that distance from school and the mathematics performance of the learners tend to move in opposite directions, as one variable increases, the other decreases. The P-value of 0.206 is not significant. This means that the relationship between distance from school and Mathematics Performance does not impact each other in any kind. It was aligned with the study of Camello (2014) stating that there was no discernible disparity in the performance of students and the distance of the school. Nonetheless, the relationship may differ based on the specific demographic under investigation. Since the geographical location of the study is in a rural area with vast rice fields learners are used to the long walks and travel. Furthermore, cultural differences and societal norms can also influence the relationship between variables. Lastly, individual personality traits and experiences can also influence the relationship between variables.

Table 8: Significant Relationship Between Socio-economic Status and Mathematics Performance of Elementary Learners

Variables	Pearson Correlation	P-value	Remarks
Socio-economic Status	0.011	0.900	Not Significant
Mathematics Performance			

A correlation was conducted to test the relationship between Socio-economic Status and the Mathematics Performance of learners, A Pearson correlation of 0.011 which is not significant and correlation coefficient of 0.900

indicates a positive correlation. It was found that there is no notable connection between socio-economic status and Mathematics Performance. . It appears that the influence of socio-economic status on Mathematics Performance in this specific context is not significant. It is crucial to take into account other variables that may influence Mathematics Performance in various environments. Farooq, et al., 2011, cited from Qasem (2018), declared that even though socioeconomic status (SES) unquestionably serves as an important component in determining the educational achievement of children; parental education does not predict the academic outcomes of the child.

4. CONCLUSIONS

Based on the results, it was determined that screen time significantly affects the Mathematics Performance of learners. On the contrary, the results of distance from school and socio-economic status which presents that there is no significant relationship between the two variables and Mathematics Performance. Each learner experience different disparities. According to the respondents, screen time affects their mathematics performance due the entertainment the technology provides which redirects their focus from learning. However, distance from school and socio-economic status does not greatly impact their mathematics learning since they are already used to these situations in their daily living.

4.1 Implications of Future Research.

According to the study's findings, these are the conclusions that can be drawn. The subsequent suggestions were put forth:

1. The community must collectively address the threats and take necessary measures to ensure safe travel of the learners from their homes to school.
2. The teacher must take patience in understanding each learner’s individual circumstances, strengths, and the challenges they face to build a strong, trusting relationship.
3. The parents must establish clear rules about the amount of time screen usage, and monitor the apps, games and websites children use to ensure appropriateness and safety.

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